

Glucagon for Refractory Anaphylaxis

To the Editor:

Anaphylaxis is an allergic reaction that is rapid in onset. When missed, it leads to shock and may be fatal. Patients with refractory or very severe anaphylaxis have cardiovascular and/or severe respiratory symptoms; so, they are treated in intensive care unit for a longer period. Epinephrine is a lifesaving medication that acts on beta-2 receptor sites of smooth muscles in the airways, thereby activating cAMP receptors with increased circulation and perfusion. But, patients on beta-blockers may not respond promptly to epinephrine.¹ Glucagon stimulates higher cAMP levels and overrides the alpha and beta receptors so that epinephrine does not need those receptor pathways to work. This study presents a case in which a patient who presented with anaphylactic shock after initiation of interleukin-5 therapy for asthma did not respond to epinephrine, but the shock was resolved after glucagon infusion.

A 54-year-old woman with a medical history of asthma and coronary artery disease had allergy to latex, nicotine patch, and iodine that gave her rash and hives. She had an anaphylactic reaction to seafood in the past that responded to epinephrine therapy. Hence, she used to carry epinephrine pens with her. She was on albuterol and tiotropium bromide inhalation for asthma. In an attempt to optimize her symptoms, she was started on interleukin-5 inhibitor therapy with a dose of mepolizumab. But, within 30 minutes of the drug administration, she noticed that her throat was closing. She started to have shortness of breath and generalized itching. She had intramuscular epinephrine autoinjector that she administered herself. Her symptoms persisted. She was given another 0.3 mg of intramuscular epinephrine along with 2 albuterol inhalations. Her symptoms improved and she was sent to the emergency department.

In the emergency department, she received epinephrine 0.3 mg, methylprednisolone 125 mg, and diphenhydramine 50 mg. Her vital signs were stable at a heart rate of 77 beats per minute and a blood pressure of 186/118 mm Hg. She was saturating 96% on room air. But, she continued to feel that her throat was closing. The allergy team was consulted, and a review of other medications was conducted.

She was on metoprolol at home, which she took in the morning of the visit day. Hence, 3 mL of glucagon bolus

infusion with a dose of 3-mg glucagon was given. Her symptoms subsided significantly. She was transferred to medical intensive care unit. We continued prednisone 40 mg for 7 days and she was discharged home after 24 hours of monitoring. Given her history of atopy and risk of anaphylaxis in future, metoprolol was discontinued indefinitely.

The recommended dose is an initial bolus of 1–5 mg. Later, an infusion of glucagon can be given at the rate of 5–15 micrograms per minute.² The dose is titrated to achieve adequate clinical response. Our patient responded well to bolus dose, and infusion was not required. Very few cases have been reported where glucagon infusion was needed. According to Lieberman et al,² patients taking atenolol who developed anaphylaxis to contrast dye presented with refractory shock and were treated effectively with glucagon. The shock was fully resolved after glucagon infusion.¹

Glucagon acts through the noradrenergic pathway by stimulating adenylate cyclase. This leads to production of cyclic AMP that produces the positive inotropic and chronotropic effects that are required during anaphylaxis. Adverse effects include nausea and vomiting, especially when given rapidly.³ This case illustrates the need for understanding the pharmacodynamics of patient's medications and appropriate use of glucagon therapy in averting refractory anaphylactic shock.

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